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Identifying the most promising population preventive interventions to add 5 years to healthy life expectancy by 2035, and reduce the gap between the rich and the poor in England

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Meeting Report

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Meeting

Following correspondence about achieving the vision outlined in *"Prevention is Better than Cure"* (DHSC 2018) between Theresa Marteau and the Secretary of State for Health and Social Care, the former, together with Martin White, Mark Petticrew and Harry Rutter, was encouraged to convene an independent expert meeting to summarise the relevant evidence and submit a report to DHSC. Wellcome Trust hosted the meeting.

Participants were academics and others with expertise in population-level interventions, policy experience and knowledge of one of four behavioural risk factors - smoking, alcohol consumption, unhealthy diet or physical inactivity. Before the meeting participants were invited to contribute evidence on two sorts of intervention: those for which there was good evidence; and promising interventions which lacked good evidence but were supported by theory or early data. This and other evidence was then critically reviewed at the meeting and forms the basis of this report.

Health as a government priority

The important determinants of health that could effect the change necessary for a substantial improvement in health all lie outside the health sector. For the government to improve population health, it needs commitment to change from all government departments. For example, the Department for Transport should have supporting health (e.g. reducing transport related air pollution, injuries, increasing physical activity) as a key goal (as Transport for London does), in the same way that it has goals to reduce congestion and facilitate economic growth. If this shift in mind-set could be achieved across government, it could unlock significant improvements in population health with substantial concomitant societal benefits.

Four risk factors

The leading causes of years of life lost in England – the focus of the meeting - are smoking, alcohol consumption, unehalthy diet and physical inactivity.[1] Given that these four behavioural risk factors are socio-economically patterned, changing them has the potential both to increase healthy life expectancy and reduce the gap between the rich and the poor. For example, smoking is the leading cause of premature death killing nearly 80,000 people in England a year (DHSC,2018). Half the difference in life expectancy between the richest and poorest is attributable to smoking.[2]

Population-level approaches to prevention

There are two complementary approaches to prevention: targeting individuals at high risk of ill-health and targeting whole populations.

The focus of the meeting was on targeting whole populations to create environments that support and help sustain healthy behaviours. Population level interventions may have small effect sizes at the individual level, but have very wide reach, meaning that the overall population impact is

substantial. For example a seemingly 'small' average 13kcal per person reduction in energy intake among all young people (aged 16-29 years) would cut the number of young people with obesity in the UK by approximately 130,000 or 7%.[3]

Population level interventions, particularly those that place low demands on people's cognitive, social, material and financial resources, are more liable to have equitable effects or reduce inequalities.[4,5] Population interventions are also highly cost effective or even cost saving.[6]

Population level interventions not only offer an effective means of equitably achieving substantial gains at population level, but can also help to ensure that interventions targeting individuals at high risk are more effective. Targeting individuals through, for example, weight loss programmes without changing the environments that cue excess energy consumption is akin to treating people for cholera then sending them back to communities supplied with contaminated water.

Evidence of effectiveness and impact

We present a summary of the findings of the meeting in the Panel and in Tables 1-4. These list and summarise the interventions that the meeting participants prioritised, as having sufficient evidence of effectiveness to justify implementation.

The tables highlight (i) the underpinning evidence of effectiveness; (ii) the potential impact considering population reach and likely effect size of the intervention; and (iii) the potential impact on health inequalities.

Some of these interventions have been implemented, or are being considered, by other countries or jurisdictions (e.g. minimum unit pricing in Scotland and several provinces in Canada; cycling infrastructure in Amsterdam and Vancouver). The list of interventions included is informed by the World Health Organization report on 'best buys' to prevent non-communicable diseases,[7] and the Bloomberg Philanthropies report on fiscal policies for health.[8]

Grading the evidence

We have further graded the evidence in terms of:

i. potential for improving population health: ** = very high, * = high

ii. potential for reducing the gap between the poorest and richest: ** = very high, * = high

To note

1. There will be synergies between some of the recommended interventions such that their cumulative effect will be greater than their introduction as single components; e.g. the effect of fiscal and economic policies concerning travel will be greater if combined with appropriate spatial planning approaches and development of safe attractive infrastructure for walking and cycling.
2. Implementing <u>all</u> of these interventions would be the starting point for making the step-change needed to show improvements in population health and reduce the gap in health between the richest and the poorest in England. Further population level interventions are likely to be necessary.

Promising interventions

Tables 5-8 describe promising interventions for which there was insufficient evidence to merit inclusion in the main tables, but are are nevertheless well founded in theory and worthy of consideration. The evidence for these interventions is not presented in detail and not graded. The items are therefore not listed in any priority order.

Panel: Interventions with sufficient evidence to justify implementation

	Improvement potential	Equity Potential
Tobacco Control		
1. Fiscal and economic		
Taxation to ensure year on year real price increases in tobacco	★★	★★
Reform of current taxes on tobacco to ensure a consistent unit price: e.g. close gap on taxes and price between manufactured and hand-rolled tobacco	★★	★★
2. Marketing		
Well-designed mass media campaigns	★	★
Pack inserts on the benefits of quitting and sign-posting to smoking cessation services	★	★
3. ***Availability***		
Increase legal age for purchasing tobacco from 18 to 21 years	★	★
Alcohol control		
1. Fiscal and economic		
Minimum Unit Price	★★	★★
Taxation to ensure year on year real-price increases in alcohol	★★	★★
Reform of current taxes on alcohol to ensure a consistent unit price: i.e. tax should be proportional to percentage alcohol by volume	★★	★★
2. Marketing		
Advertising and sponsorship restrictions or bans to reduce exposure to children	★	★
3. Availability		
Reduce availability (spatial or temporal or age based): e.g. through Early Morning Restriction Orders; enforce existing minimum age purchase laws; placing limits on the number and density of outlets in certain areas	★	★
4. Other		
Reduce and enforce the drink drive limit from 80ng/100ml to 50ng/100ml blood alcohol level	★	★
Food-related		
1. Fiscal and economic		
Tax to incentivize industry to reformulate: e.g. extend SDIL to other drinks with added sugar; and/or apply a similar levy to foods high in sugar or salt	★★	★★
Regulating to restrict price promotions on less healthy foods	★	★
Fruit and vegetables incentive scheme for families on low income	★	★★
2. ***Marketing***		
Advertising and sponsorship restrictions: e.g. comprehensive restrictions on exposure of children to unhealthy food advertising on broadcast and non-broadcast media	★	★★
Point of choice information: e.g. mandatory calorie labelling in the out of home sector	★	★
3. ***Availability***		
Increase availability of lower salt products and reduction in higher salt products, through voluntary or mandatory programmes	★★	★
Enforce and extend existing buying standards for food in public sector outlets including schools, hospitals, prisons, and local and national government agencies	★	★
Restrict placement of unhealthier foods in high-sales areas of stores, including aisle ends and retail checkouts, and within online food stores	★	★
Regulate to mandate smaller (lower calorie) portions of ready to eat foods	★	★
Activity-related		
1. Fiscal and economic policies		
Taxes to shift affordability in favour of public transport and away from car use; e.g. reinstate the fuel duty escalator	★★	★
Road user pricing: e.g. parking and congestion zone charging	★★	★
2. Marketing		
Mass media campaigns to encourage physical activity e.g. *This Girl Can*	★	★
3. Availability		
'Whole system' spatial planning to promote physical activity: e.g. planning for high-density mixed land-use, with integrated public transport, plentiful green/blue space, and high levels of walkability and cycleability ensured by safe and attractive infrastructure	★★	★
Regular mass participation physical activity events: e.g. *parkrun UK, Ciclovia*	★	★

Table 1: Tobacco control: Interventions for which there is sufficient evidence to justify implementation

Description of intervention	Evidence of effectiveness	Scope for population impact	Reducing the gap between the poorest and most affluent
1. Fiscal and economic measures			
1.1 Reducing the affordability of tobacco through tax policies E.g. Regular significant tax increases and price rises; close the gap in taxes and price between manufactured and roll your own tobacco	Reducing affordability of tobacco through tax policies is considered the most effective mechanism for reducing consumption and prevalence. However, the tobacco industry uses pricing strategies to undermine the impact of tax on price.[9–11]	** The single most important measure in reducing smoking prevalence.	** Likely to reduce the gap: reduced affordability has a bigger impact on poorer smokers. However, although reducing affordability has been shown to have a bigger impact on poorer smokers, they tend to be more heavily addicted and find it harder to quit successfully than more affluent smokers. And for those who don't quit the increased cost of smoking becomes a bigger proportion of their outgoings when they are already on limited budgets with additional negative welfare implications. This can be mitigated by the provision of specialist stop smoking support which enhances quit success.[12–14]
1.2 Reform to ensure consistent unit price, i.e. close the gap on taxes (and prices) between manufactured and roll your own tobacco	Tobacco taxes and price increases are undermined by tobacco industry pricing strategies,[15] but to be most effective investment in their enforcement, which has been cut back in recent years, needs to be enhanced.[16]	** Whilst illicit tobacco does undermine taxation and pricing policies and government revenues, roll your own tobacco is a far bigger contributor to cheap tobacco.[10]	** Likely to reduce the gap: The roll your own tobacco market has grown very significantly as smokers have downgraded to roll your own as a means to reduce the cost of smoking, particularly younger and poorer smokers.[15,17] The significant differential between tax on factory-made cigarettes and the much lower tax on roll your own tobacco remains a problem.[15]
2. Marketing			
2.1. Increase well-designed public education campaigns. There has been a considerable reduction in government investment in these over last few years. In 2012/13 the national spend on mass media by PHE was over £8 million but it has fallen to £1.5 million in 2016-17, and £1.99 million in 2017/18.	Based on controlled trials and evaluations (natural experimental studies) of campaigns in the UK and US: Well-designed public education campaigns using a range of channels can influence social norms, increase support for policy measures, increase quit attempts (both unaided and use of NHS SSSs) and reduce smoking uptake.[18–24]	* In the UK, it was estimated that Stoptober campaign in 2012 led to an additional 350,000 quit attempts, 8800 permanent quitters, an additional 10,400 discounted life years (at a cost of £415 per discounted life year).[25]	* Potential to reduce the gap (contingent on delivery). Public education campaigns can be targeted to reduce inequalities.

Description of intervention	Evidence of effectiveness	Scope for population impact	Reducing the gap between the poorest and most affluent
2.2 Government mandated tobacco pack inserts on quitting	Inserts highlighting the benefits of quitting, or providing tips on how to do so have been found effective in Canada. While reading on-pack health warnings significantly decreased over time, reading inserts significantly increased, with more frequent reading of inserts associated with self-efficacy to quit, quit attempts and sustained quitting at follow-up.[26]	* This would be an inexpensive measure, targeted at smokers, with the potential for significant impact at population level, and is a natural extension of the existing packaging and labelling requirements.	* Potential to reduce the gap. Research suggests that lower SES smokers are equally or more responsive to Graphic Health Warnings than higher SES smokers, but the evidence is insufficient so far to be sure whether this is true for pack inserts.[27,28]
3. Availability			
3.1. Age of sale restrictions. Increase the age of sale from 18 to 21.	Increasing the age of sale from 16 to 18 in England was associated with reduction in smoking prevalence among under 16s in England.[29] Increasing the minimum age reduces initiation rates in both teenagers and young adults.[30]	* In the US, the Institute of Medicine estimates that increasing the minimum age of purchasing tobacco to 19, 21 and 25 years would reduce the prevalence by 3%, 12% and 16% when today's teenagers reach adulthood.[30]	* Neutral. The increase in England from 16 to 18 years had a similar impact across different socio-economic groups.[31]

Table 2: Alcohol control: Interventions for which there is sufficient evidence to justify implementation

Description of intervention	Evidence of effectiveness	Scope for population impact	Reducing the gap between the poorest and most affluent
1. Fiscal and economic measures			
1.1 Minimum unit pricing To have a minimum or floor price per unit of alcohol that is systematically uplifted in line with inflation. This is a targeted intervention – it only effects cheap drinks, typically sold in the off-trade. It disproportionately effects heavy or problem drinkers, having little impact on moderate drinkers.[8]	Evaluation of a 10% increase in the minimum unit pricing in Canada was associated with reductions of alcohol beverages by 8.4%, with greater reductions for higher strength drinks,[32] but no evaluation of impact on health.[32,33] Has also been introduced in Scotland, Russia, Belarus, Moldova and Kyrgyzstan, but with limited or no evaluation to date.[34,35] Major evaluation through a portfolio of studies of Scotland MUP has been commissioned.	** In the first five years, a 50p MUP[1] in England is estimated to save 1,148 lives, reduce hospital admissions by 74,471, and cut health care costs by £326 million. Over the next 20 years a 50p MUP would reduce cancer deaths by 670 and prevent 6,300 hospital admissions for cancer.[36,37] [1]Note the 50p figure is based on analysis dating from 2008 onwards, the suggested equivalent figure now would be 70p	** Likely to reduce the gap. Compared to tax increases under the current system[2], alcohol-content-based taxation or minimum unit pricing would lead to larger reductions in health inequalities across income groups: mortality among drinkers in routine/manual occupations reduce by 7.8% for minimum unit pricing, 6.1% for alcohol-content-based taxation, and 3.2% for tax rises.[38] [2]Policies here being equivalized to achieve same overall gain in population health.
1.2 Systematic increases in alcohol duties E.g. Duty escalator (in place across UK 2008-2013)	The Alcohol Duty Escalator went some way to reversing harmful alcohol trends in the UK by tackling affordability. Introduced in 2008, it saw duty on alcohol rise 2% above inflation each year; affordability began to fall for the first time in years and was 5% lower in 2013 than 2008.[39]	** Making alcohol less affordable has been described by NICE as "the most effective way of reducing alcohol related harm".[40] Modelling suggests that raising alcohol duty above inflation for five successive years would reduce alcohol related deaths by 5% and hospitalisations by 4%, averting over 600 fatalities a year.[41]	** Likely to reduce: Affordability of alcohol is strongly related to inequalities in alcohol harms.[42]. However, UK retailers were found to under-shift tax rises for lower priced products, whilst over-shifting for more expensive products.[43] Note there is a greater burden of harm from the same levels of excess alcohol consumption for poorer people,[8] so even measures that produce equitable reductions in alcohol may have a disproportionate benefit for poorer people.
1.3 Duty system reform E.g. Ensure alcohol duties are proportional to alcohol volume	Notable differences in the duties levied on different types of drinks (e.g. cider vs beer), which make some drinks more affordable/attractive to harmful drinkers.[44]	** Complements the above measures, and potential to have similar population impacts to the above fiscal and economic measures as it would aim to achieve similar ends.	** Likely to reduce: See 1.1 (alcohol-content-based taxation)
2. Marketing			
2.1 Marketing and promotion restrictions E.g. Ban price-based promotions and strengthen regulation to reduce exposure of children and young people to alcohol advertising; Enact comprehensive restrictions on exposure to alcohol	A PHE evidence review of interventions to reduce harm concluded that self-regulatory marketing codes were inadequate.[42] Systematic reviews find exposure to alcohol marketing, particularly advertising, amongst children and young people is	* Unknown – existing evidence base limits ability to estimate population impact	* Unknown

advertising across multiple types of media, in line with WHO recommendations.	associated with higher consumption and binge drinking.[45–48]		
3. Availability			
3.1 Restrictions on availability of alcohol. E.g. Minimum purchase age laws; Temporal policies- regulating the days and hours of alcohol sale (e.g. Early Morning Alcohol Restriction Orders); Spatial policies - placing limits on the number and density of alcohol outlets; in neighbourhoods	Strong, consistent evidence from both cross-sectional and longitudinal observational studies: Relationship between alcohol-related deaths and crime and number of alcohol outlets in local neighbourhoods.[49–51]	* The World Health Organisation lists interventions that restrict the availability of retail alcohol amongst the three 'best buy' policies to reduce alcohol harm (alongside increases in price and bans on alcohol advertising).[7] In Australia, laws were introduced in 2014 to restrict alcohol sales in the popular Kings Cross precinct in Sydney after 3am. This measure was associated with a 49% reduction in non-domestic assaults in the area by 2016.[52]	* Potential to reduce, as outlet density is highest in most deprived areas, but will be contingent on implementation
4. Other			
4.1 Reduce the drink drive limit from 80mg/100ml to 50mg/100ml with strong enforcement	International studies of lowering the legal limit from 80mg to 50mg demonstrate reduction of serious crashes in by 7% to 14% and fatal crashes by 8% to 36%.[53]	* It is estimated that a cut would save about 5 lives and 95 people from serious injury each year in the UK.[54]. Effectiveness likely to be dependent on enforcement, e.g. through random breath testing.[55] Greater benefits may come from reducing overall levels of alcohol consumption.	* Neutral (alcohol related RTAs are not patterned by SES).[53]

Table 3: Food-related: Interventions for which there is sufficient evidence to justify implementation

Description of intervention	Evidence of effectiveness	Scope for population impact	Reducing the gap between the poorest and most affluent
1. Fiscal policies			
1.1Taxes to incentivize industry to reformulate e.g. extend SDIL to other drinks with added sugar; and/or apply a similar levy to foods high in sugar or salt.	Milk-based drinks and alcoholic drinks (e.g. alcopops) may contain similar amounts of sugar as soft drinks and are sold in large volumes. Emerging evidence of effectiveness of SDIL (e.g. Pell at al, Scarborough et al, in press) as well as measured and modelled impacts of sugar in liquid form make strong case for these extensions.[56,57] Taxation of sweet confectionary, chocolates and biscuits might be particular effective as price increases for these are likely to prompt reductions in consumption of other sweet products.[58]	** Modelling studies estimate benefits from, e.g. reformulation due to the SDIL (a 15% reduction in mid-sugar drinks and 30% reduction in high-sugar drinks) would reduce the number of adults with obesity by around 150,000 and prevent 19,000 new cases of type 2 diabetes per year.[56]	** Likely to reduce the gap - due to existing socio-economic patterns of consumption of processed food and sugar.
1.2 Regulating price promotions on unhealthy foods (including volume-based, multi-buy offers and discounts) This might have a variety of channels e.g. within grocery stores, but also out-of-home food (e.g. regulating meal deals from independent takeaways aimed at children such 3-5pm £1.99 meal deals)	Analysis of consumer panel data consistently shows that price promotions on less healthy food items increases purchases of those food items.[59,60] No studies of actual restrictions, although they have been implemented elsewhere, e.g. Germany bans all price promotions.	* Not quantified and unclear to what extent excess purchases drive excess consumption.	* Unknown, but may have no or limited effect as all consumers (rich and poor) buy a similar proportion of food on promotion.
1.3 Fruit and vegetable incentive schemes for families on a low income	Evidence of effectiveness from similar scheme in the US, which may not be generalisable to the UK.[61] A recent, systematic review concluded that 10% decreases in the price of healthier food are associated with 12% increases in consumption, and 14% increases in the consumption of fruit and vegetables specifically.[62]	* Not quantified.	** Likely to reduce the gap – targeted measure.
2. Marketing			
2.1. Restrict advertising: 9pm watershed on TV (and other media) advertising of HFSS foods	There is substantial systematic review evidence that food marketing influences children's preferences, purchasing requests and consumption.[63,64] Current Ofcom regulations restricting advertising of HFSS foods during/around children's TV	* Hard to quantify as response of industry is uncertain. A 9pm watershed could reduce the number of adverts for unhealthy foods seen by a child by around 1.5 per day, equating to around a 9kcal	** Likely to reduce the gap - due to the socio-economic patterning of TV viewing and consumption of HFSS foods.[68]

Description of intervention	Evidence of effectiveness	Scope for population impact	Reducing the gap between the poorest and most affluent
	programmes have not reduced children's exposure to HFSS advertising as advertising shifted to family entertainment programmes.[65] Shift away from TV to online suggests the importance of also regulating online and on-demand viewing, although evidence based is less developed for this domain.[66]	reduction in energy intake and a 7% cut in child obesity.[67] (Mytton et al, in press)	
2.2 Mandatory calorie labelling at point of choice in out of home food outlets (including online)	Systematic review evidence that mandatory calorie labelling associated with reduction in calorie content of menu items; and reductions in calories purchased.[69,70]	* UK Government health impact assessment estimates around 10kcal reduction per adult per day.[71]	* Unknown. Potential to widen as people who are health literate are more likely to engage and modify choices; however a secondary impact will be that labelling is a trigger for reformulation and reduction in portion sizes, which may reduce inequalities in consumption.
3. Availability			
3.1 Salt reduction strategy – mandatory or voluntary industry programme.	Previous voluntary industry scheme highly successful with (modelled) impacts on blood pressure and stroke at population level.[72] Pace or reduction slowed during the industry responsibility deal period.[73] There is scope for further reductions in salt content of all processed foods, which could contribute to further reductions in morbidity and mortality. But needs a new initiative from government and voluntary agreements may be ineffective to achieve further change.	** Reducing salt intake by 3 g/day might reduce mean population systolic blood pressure by approximately 2.5 mmHg. This would equate to a 2% decrease in the risk reduction model. This would prevent approximately 4450 deaths from cardiovascular disease, with total discounted savings overall of approximately £347m over a decade.[74]	* Unknown
3.2 Enforce and extend existing buying standards for food in public sector outlets (schools, hospitals, prisons, local and national government agencies)	Evidence suggests school food standards in primary and middle schools improved food eaten at school, and overall diet, and reduced inequalities in diet. However, implementation is poor nationally and especially weak in secondary schools.[75–78] Government buying standards exist but the extent to which used and implemented is unclear.	* Not quantified.	* Unknown: does focus on workplaces so potential to widen inequalities with respect to those who are not in employment*
3.3 Restrict placement of unhealthier foods in high-sales areas of stores, including aisle ends and retail	Analysis of consumer panel data suggests that voluntary policies to remove unhealthy foods from check-outs led to a reduction in	* Not quantified and may be hard to quantify as response of retailers and other parts of the food industry is unknown.	* No evidence that the intervention narrows inequalities in food purchasing

Description of intervention	Evidence of effectiveness	Scope for population impact	Reducing the gap between the poorest and most affluent
checkouts, and within online food stores	purchase of those items from affected stores.[79–82]		
3.4 Portion size reduction for takeaway food	Portion sizes are very large (e.g. 1200-1800 kcal per portion).[83]. People consistently consume more food or non-alcoholic drinks when offered larger sized portions.[84] The size of this effect suggests that eliminating larger portions from the diet could reduce average daily energy consumed by 12-16% among UK adults.[85] Proof of principle in the North East, using smaller packaging to ensure smaller portion sizes of fish and chips; and preliminary work in London.[86] But likely to require national co-ordination and working with the 10-12 main wholesale suppliers to the takeaway industry in UK to gradually reduce portion size.	* Not yet quantified, but clear potential	* No evidence but as a low agency structural intervention has potential for reducing inequality

Table 4: Activity-related: Interventions for which there is sufficient evidence to justify implementation

Description of intervention	Evidence of effectiveness	Scope for population impact	Reducing the gap between the poorest and most affluent
1. Fiscal and economic policies			
1.1 Taxes to shift affordability in favour of public transport and away from car use E.g. reinstate the fuel duty escalator	Generally increases in fuel duties are associated with a shift to public transport. Public transport use tends to be associated with more activity (walking) than car-use.	** Not quantified. Impact will depend on magnitude and duration of tax increases.	* Unknown – and likely to be influenced by nature of the intervention.
1.2 Road user pricing. E.g. parking and car congestion charging	The introduction of the London congestion charge was associated with a 15% reduction in car journeys in central London; and an associated increase in public transport. It has been suggested that this freed up road space for walking and cycling.[87] Observational studies show paying to park or absence of workplace parking is strong predictor of undertaking active travel on way to work.[88–90] No studies of	** Not quantified. Impact will depend on 'dose' of intervention and contextual factors.	* Unknown – and likely to be influenced by nature of the intervention.

Description of intervention	Evidence of effectiveness	Scope for population impact	Reducing the gap between the poorest and most affluent
	changes in workplace parking policy. Significant challenges around implementation, an evidence base on 'how to' implement exists.[89]		
2. Marketing			
2.1 Mass media campaigns	Recommended by WHO as a best buy.[7]	* Not quantified.	* Unknown and likely to depend on implementation.
3. Availability			
3.1 Spatial planning to promote physical activity Covers many aspects of the local urban environment, especially factors relating to high population density, walkability and green space	There is (mainly cross-sectional) evidence that physical activity is related to factors such as urban density, nearness of destinations, mixed land use green space.[91,92]	** Very hard to quantify. Interventions play out over long time period; and likely to influence the effectiveness of other approaches.[7]	* Uncertain and may depend on nature of investment/ sites chosen for investment.
3.2 Town-wide cycling and walking 'whole system' approaches. These do everything possible across a town or city to improve physical and social conditions for walking and cycling, such as infrastructure changes (bike lanes; improved crossings/junctions; filtered permeability) social marketing; bike training. May also include aspects of items 1.2 to 1.4 below.	Modal shift in cycling from controlled natural experimental study amongst cycling cities and towns in the UK – relative to match controlled.[93] Review for Sport England (in press) found 19 controlled evaluations, of which 14 reported increases in cycling and/or walking compared to control (5 reported no impact). Existing evidence is for cities/towns which are locally supportive of these initiatives, effects are less clear if this local support is absent. International case studies, e.g. Amsterdam, Vancouver (cycling) and London (public transport/walking) give exemplars of large sustained increases over many years with sustained political support and investment.	** Impact depends on intervention being sustained over period of years and done in sufficient 'dose'. The cycling cities and towns study found a 0.7 percentage point increase in cycling to work relative to matched controls for an expenditure of £14-17 per head over a 3-7 year period.[93] Larger changes likely to take more time, require sustained political will resourcing. Applying Dutch cycling rates to commute trips in England, making allowance for hilliness and commuting distance, could prevent around 800 premature deaths a year in England, with an average health economic benefit from the deaths averted of £5 million per local authority.[94]	* Data from cycling cities and towns found similar increases in cycling across SES groups.[93]
3.3 Safe attractive infrastructure for walking and cycling to reduce actual and injury risk and perceptions of road danger to enable active travel	Concerns about safety, particularly for parents and children, are cited barrier to active travel.[95,96] Access to high quality walking and cycling routes is associated with increases in walking and cycling.[97,98]	** Controlled natural experimental studies,[97,98] show modest to large increases in walking or cycling for people living near good quality new routes compared to those living further away.	* Uncertain and may depend on nature of investment/sites chosen for investment.
3.4 Regular mass participation events E.g. Ciclovia in Bogata (closed streets every Sunday), Park Run in the UK	Evidence from observational studies (largely uncontrolled) suggests regular mass participation events are associated	* Not quantified.	* Unknown. Park run is accessible attracting those who are less active, although its impact by SES is less clear.

Description of intervention	Evidence of effectiveness	Scope for population impact	Reducing the gap between the poorest and most affluent
	with increases in physical activity amongst inactive adults.[99–102]		

Promising interventions for which evidence is insufficiently strong to merit implementation

Table 5: Tobacco

Expanding smoke free areas.	This intervention involves expanding smoke-free areas to include greater number of places where children go eg parks, stairwells in communal housing.
Dissuasive cigarettes.	This intervention would involve the use of messages such as smoking kills writing on cigarettes
Banning/restricting smoking in TV/films and digital media.	This intervention aims to reduce the exposure of young people to images of smoking which have been proven to increase uptake of smoking.
Making the polluter pay.	This is a charge on the tobacco transnationals designed to deliver a fixed sum annually to the Government to fund high impact, evidence-based measures to encourage smokers to quit, and discourage youth uptake.
Reduce cigarette outlet numbers and density.	Largely correlational evidence. Modelling studies predict that outlet density can have an impact but may need to reduce density below a certain threshold. Growing evidence that density and or proximity impacts on various aspects of smoking behaviour (e.g. uptake, quitting).[103,104]

Table 6: Alcohol

A 'lid levy'	A levy on drinks sold in the off-trade (drinks sold with a closed lid, e.g. in supermarkets) which tend to be cheaper and is thus a measure to increase the cost of cheap alcohol that does not penalise pubs or restaurants. It could be used to fund alcohol related public health interventions, including prevention programmes and treatment
Reformulation	There is scope to reformulate drinks to reduce alcohol content
Government funded health campaign	Develop a Government-funded programme of health campaigns, without industry involvement and in line with the Chief Medical Officer's guidelines, to increase public knowledge of alcohol and its links to a wide range of physical and mental health conditions.
Statutory requirements for labelling	Develop statutory minimum requirements for labelling alcohol products. This should include health warnings, ingredients and nutritional information alongside existing advice.
Ignition locks	Alcohol interlocks are designed to prevent driving with excess alcohol by requiring the driver to take an in-car breathalyser test before starting the engine.[105] Can be circumvented, but prevents spontaneous or accidental intoxicated driving.

Dry January	A public health campaign urging people to abstain from alcohol for the month of January, recently gaining momentum in the UK. Affects those choosing to participate, but potential wider reach through changing social occasions that would have involved drinking into non-drinking occasions.

Table 7: Food-related

Change VAT structure for healthy and unhealthy foods	Luxury foods are already VAT liable at the higher rate, but core foods are exempt, this results in anomalies with Jaffa Cakes being exempt but chocolate covered biscuits being liable for VAT. This could be reformed along health lines to levy VAT on food related to healthiness, as Australia effectively does.
Calorie Levy to incentivise reformulation of highly calorific foods, in grocery retailing and out of home outlets	Introduction of a Levy on manufacturers, importers, and out of home outlets, with a tiered design similar to the SDIL, to incentivize industry to reduce total calories per portion in foods with excessive energy load.
Changes in trade tariffs on imports of unhealthy food products and commodities	Trade tariffs could be adjusted to shift the balance of imports of healthy and unhealthy food products or commodities. For example, a higher tariff on imported sugar could reduce demand on sugar, helping to in incentivise a reduction in high levels of sugar in processed foods. Such measures would need to be balanced against domestic production (e.g. beet sugar), since replacement with cheap domestic sugar would be counterproductive to achieving the health goal.
Agricultural subsidies for healthier produce (e.g. leafy green vegetables); and tarrifs for less healthy produce (e.g. sugar beet)	Incentivising domestic production of fruits and vegetables could help to reduce prices, increase availability and increase consumption. Evidence to support this comes from Finland (North Karelia experiment). Such an initiative should be selective and not focus on (for example) root vegetables, which given the UK climate are already low cost staples, but focus on a wider range of fruits and vegetables currently imported at higher cost. Root vegetables such as sugar beet could be subject to tarrifs.
Greater use of local planning instruments to improve the food environment	Density of takeaways is associated with obesity, and consumption of ready to eat foods from out of home outlets is growing rapidly.[106] Evidence is emerging on a wide range of planning instruments that are used by local government to prevent proliferation of takeaways in general or in specific zones, but these instruments are hard for local authorities to use and under-evaluated.(Keeble et al, In Press)
Universal free healthy school breakfast for primary age children	Some evidence that this could improve healthy eating and educational attainment and may also reduce inequalities: e.g. https://www.ifs.org.uk/publications/9202 and http://decipher.uk.net/what-do-free-school-breakfasts-mean-for-health-inequalities/
Free school fruit and vegetable scheme for all school aged children	There has been one evaluation of the UK scheme https://www.nfer.ac.uk/evaluation-of-the-school-fruit-and-vegetable-pilot-scheme-final-report/. It showed increased children's awareness of fruit by enabling them to try previously unfamiliar items. The scheme also significantly improved children's consumption of fruit, but appeared not to have any wider impact on diet. Increased consumption of fruit was not sustained when children's participation in the scheme came to an end. However, there was some evidence of increased knowledge of healthy eating, particularly in children from deprived areas. Currently only children aged 5-7 y are eligible for the scheme but it could be expanded to all school aged children. Could helpfully supplement school food standards in normalising healthier eating among children if applied consistently across all school years.
Support better infant feeding	E.g. Stop labelling of foods as suitable from 4 months/Stop adding salt and sugar to weaning foods/Ban baby snacks and drinks/Review back of pack information on formula milk so that over feeding of infants is not encouraged Most infants are weaned on to early. This is partly likely to because of how weaning foods are marketed and labelled (front of pack and back of pack). Formula fed babies are heavier than breastfeed ones. Body weight tracks though to childhood.

Further Advertising Restrictions	The case has been made for restricting advertising on TV and online, but new forms of advertising are appearing, and are likely to continue to do so. Examples include adverts on the back of bus tickets, on debit card handsets in stores, on petrol pump handles, 'trojan' telephone boxes – anywhere that has a high public footfall and offers and opportunity for mass communication will become a target. As other forms of advertising are restricted the use of these may grow.
Advertising and marketing, combined with in-store activation, of healthy foods such as fruit and vegetables	Government support to incentivise marketing of healthy foods would be a logical complement to restrictions on unhealthy food advertising, helping to adjust the balance of public exposure. The Food Foundation's 'Veg power' initiative (https://foodfoundation.org.uk/veg-power-fund-a-new-initiative-to-inspire-our-kids-to-eat-more-vegetables/) aims to achieve this and has been supported by the public and businesses. However, an initiative of this sort will need government support to go to scale.
Upscale restrictions on unhealthy food advertising to restrictions on sponsorship and reduce brand advertising	Advertising is part of the way companies drive expansion of what they sell. Because of the highly competitive nature of food business this means that the food category expands which pressurizes us to buy and eat more. The new policies on advertising restrictions will mean more pressure on other routes for advertising. This is likely to mean more brand advertising and more sponsorship in the long term. Both of these are under researched.
Extend and improve nutrition information regulation: Make FOP mandatory / Extend to out of home / Introduce nutrition labelling for alcoholic drinks/standardise nutrition labelling	Potential for population impact and would ensure a consistent approach to providing consumer information across all products that can contribute to calorie consumption in particular. Could have 2 modes of action – via consumer choice and industry reformulation

Table 8: Activity-related

Healthy Streets	The integrated approach used in London to shift travel away from cars to public transport, walking and cycling. Has three elements policy level (e.g. spatial planning), network management (e.g. keeping motor vehicles away from residential streets to create quiet back streets for walking/cycling), and street design (e.g. supported by street design tool). Integrates several aspects of health: physical activity, air pollution, injuries and social cohesion. See: https://healthystreets.com/
Replace road tax with a road use tax using smart technology	Use smart technology in cars to tax car use in line with the externalities it causes: e.g. higher charges in rush hour and penalise short journeys
Greater use of street closures at weekends or evenings	Enables and encourages people to see street space differently, and helps challenge the dominance of the motor vehicle. Creates a safe space for exercise and social activity. Regular (e.g. Sunday) closures happen in many parts of the world.
Reappraisal of DfT modelling tool WebTAG	The tool, in part because of the large value it places on small time savings for journeys, biases investment decisions to road building and major infrastructure – rather than the changes needed within towns and cities to support walking and cycling. E.g. pedestrian crossings or traffic calming – will increase car journey times and risk not being supported by the model.
Review of planning system and health	Many attributes of the planning system work against physical activity (and health); fundamental changes in town design (and re-design) of existing town are likely to require changes to the underlying rules that govern and influence planning

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